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Spallation Neutron Source

FE Chilled Water Pumps Controls Functional System Design (FSD)

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A U . S . D e p a r t m e n t o f E n e r g y M u l t i l a b o r a t o r y P r o j e c t

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

FE Chilled Water Pumps Controls Description TD80003Rev 0

Operating Philosophy

Purpose:

The purpose of chilled water booster pump operation is to:

- a) Energize one of two chilled water booster pumps
- b) Provide detection of pump failure and automatically switch to the backup pump

Assumptions: Running two pumps simultaneously is not acceptable.

Operator Controls and Operating Modes

- 1) OFF: Both pumps are de-energized.
- 2) PUMP A IS PRIMARY: Pump A is energized and pump B is de-energized.
- 3) PUMP B IS PRIMARY: Pump B is energized and pump A is de-energized.

OPERATOR INTERFACE DEFINITIONS

Local Hardware/Manual Operator Controls

- 1) Pump A pressure differential indicator (*PDIS 4100A*)
- 2) Pump B pressure differential indicator (*PDIS 4100B*)
- 3) HOA switch (*HS 4100*)
- 4) FAULT indicator light on MCC
- 5) READY indicator light on MCC
- 6) RUN indicator light on MCC

Software HMI/EPICS Digital Operator Controls

- 1) Primary Pump Mode
 - a. OFF
 - b. Pump A is primary
 - c. Pump B is primary

Software HMI/EPICS Digital Displays

- 1) Primary Pump Mode switch status
 - a. OFF
 - b. Pump A is primary
 - c. Pump B is primary
- 2) Pump that is running and the pump that is de-energized. (*PDIS 4100A, PDIS 4100B*)
- 3) Failed Primary Pump: Differential pressure across primary pump is low. Logic de-energizes primary pump and energizes backup pump.

Software HMI/EPICS Analog Operator Controls

None

Software HMI/EPICS Analog Displays

None

Alarms

- 1) Primary pump failed, backup pump running (differential pressure is normal)
- 2) No flow (low differential pressure on both pumps)

Control Logic Description

In the OFF mode, the primary and backup pump will be de-energized .

In the PUMP A IS PRIMARY mode, the Pump A will be energized and the Pump B will be de-energized. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and Pump B will be energized. An alarm will be generated to the operator. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and a “No Flow” alarm will be generated to the operator.

In the PUMP B IS PRIMARY mode, the Pump B will be energized and the Pump A will be de-energized. After a delay period, the Pump B will be periodically checked for low flow. If low flow is detected, Pump B will be de-energized and Pump A will be energized. An alarm will be generated to the operator. After a delay period, the Pump A will be periodically checked for low flow. If low flow is detected, Pump A will be de-energized and a “No Flow” alarm will be generated to the operator.

